SEQUENCE LISTING

<110> RIKEN

<110> JAPAN SCIENCE AND TECHNOLOGY AGENCY

<120> A fluorescent indicator using FRET

<130> A41654A

<160> 46

<210> 1

<211> 26

<212> PRT

<213> animal

<400> 1

Lys Arg Arg Trp Lys Lys Asn Phe Ile Ala Val Ser Ala Ala Asn Arg
1   5   10   15

Phe Lys Lys Ile Ser Ser Ser Gly Ala Leu
            20   25

<210> 2

<211> 20

<212> PRT

<213> animal

<400> 2

Ala Arg Arg Lys Trp Gln Lys Thr Gly His Ala Val Arg Ala Ile Gly
1   5   10   15

Arg Leu Ser Ser
            20

<210> 3

<211> 20

<212> PRT

<213> animal

<400> 3

Ala Arg Arg Lys Leu Lys Gly Ala Ile Leu Thr Thr Met Leu Ala Thr
1   5   10   15

Arg Asn Phe Ser
            20

<210> 4

<211> 17

<212> PRT

<213> animal

<400> 4

Gly Val Arg Asn Ile Lys Ser Met Trp Glu Lys Gly Asn Val Phe Ser
1   5   10   15

Ser

<210> 5

<211> 20

<212> PRT

<213> animal

<400> 5

Ala Arg Arg Lys Leu Lys Ala Ala Val Lys Ala Val Val Ala Ser Ser
1   5   10   15

Arg Leu Gly Ser
            20

<210> 6

<211> 26

<212> PRT

<213> animal

<400> 6

Phe Met Asn Asn Trp Glu Val Tyr Lys Leu Leu Ala His Ile Arg Pro
1   5   10   15

Pro Ala Pro Lys Ser Gly Ser Tyr Thr Val
                20   25

<210> 7

<211> 24

<212> PRT

<213> animal

<400> 7

Ala Arg Lys Glu Val Ile Arg Asn Lys Ile Arg Ala Ile Gly Lys Met
1   5   10   15

Ala Arg Val Phe Ser Val Leu Arg
                20

<210> 8

<211> 26

<212> PRT

<213> animal

<400> 8

Leu Arg Arg Leu Ile Asp Ala Tyr Ala Phe Arg Ile Tyr Gly His Trp
1   5   10   15

Val Lys Lys Gly Gln Gln Gln Asn Arg Gly
                20   25

<210> 9

<211> 27

<212> PRT

<213> animal

<400> 9

Arg Gly Lys Phe Lys Val Ile Cys Leu Thr Val Leu Ala Ser Val Arg
1   5   10   15

Ile Tyr Tyr Gln Tyr Arg Arg Val Lys Pro Gly
              20   25

<210> 10

<211> 28

<212> PRT

<213> animal

<400> 10

Leu Arg Arg Gly Gln Ile Leu Trp Phe Arg Gly Leu Asn Arg Ile Gln
1   5   10   15

Thr Gln Ile Lys Val Val Asn Ala Phe Ser Ser Ser
              20   25

<210> 11

<211> 21

<212> PRT

<213> animal

<400> 11

Arg Arg Lys His Leu Gln Arg Pro Ile Phe Arg Leu Arg Cys Leu Val
1   5   10   15

Lys Gln Leu Glu Lys
              20

<210> 12

<211> 21

<212> PRT

<213> animal

<400> 12

Thr Glu Lys Met Trp Gln Arg Leu Lys Gly Ile Leu Arg Cys Leu Val
1   5   10   15

Lys Gln Leu Glu Lys
            20

<210> 13

<211> 23

<212> PRT

<213> animal

<400> 13

Lys Arg Arg Ala Ile Gly Phe Lys Lys Leu Ala Glu Ala Val Lys Phe
1   5   10   15

Ser Ala Lys Leu Met Gly Gln
            20

<210> 14

<211> 28

<212> PRT

<213> animal

<400> 14

Ile Lys Pro Ala Lys Arg Met Lys Phe Lys Thr Val Cys Tyr Leu Leu
1   5   10   15

Val Gln Leu Met His Cys Arg Lys Met Phe Lys Ala
            20   25

<210> 15

<211> 22

<212> PRT

<213> animal

<400> 15

Ala Cys Ile Asp Leu Leu Trp Lys Ile Ala Arg Ala Gly Ala Arg Ser
1   5   10   15

Ala Val Gly Thr Glu Ala
            20

<210> 16

<211> 27

<212> PRT

<213> animal

<400> 16

Lys Ala His Lys Ala Ala Thr Lys Ile Gln Ala Ser Phe Arg Gly His
1   5   10   15

Ile Thr Arg Lys Lys Leu Lys Gly Glu Lys Lys
            20   25

<210> 17

<211> 24

<212> PRT

<213> animal

<400> 17

Lys Thr Ala Ser Pro Trp Lys Ser Ala Arg Leu Met Val His Thr Val
1   5   10   15

Ala Thr Phe Asn Ser Ile Lys Glu
            20

<210> 18

<211> 25

<212> PRT

<213> animal

<400> 18

Lys Lys Lys Lys Lys Arg Phe Ser Phe Lys Lys Ser Phe Lys Leu Ser
1   5   10   15

Gly Phe Ser Phe Lys Lys Ser Lys Lys
                    20   25

<210> 19

<211> 24

<212> PRT

<213> animal

<400> 19

Lys Lys Lys Lys Lys Phe Ser Phe Lys Lys Pro Phe Lys Leu Ser Gly
1   5   10   15

Leu Ser Phe Lys Arg Asn Arg Lys
                    20

<210> 20

<211> 31

<212> PRT

<213> animal

<400> 20

Lys Gln Gln Lys Glu Lys Thr Arg Trp Leu Asn Thr Pro Asn Thr Tyr
1   5   10   15

Leu Arg Val Asn Val Ala Asp Glu Val Gln Arg Asn Met Gly Ser
                    20   25   30

<210> 21

<211> 21

<212> PRT

<213> animal

<400> 21

Lys Asp Gln Val Ala Asn Ser Ala Phe Gln Glu Arg Leu Arg Lys His
1   5   10   15

Gly Leu Glu Val Ile
            20

<210> 22

<211> 21

<212> PRT

<213> animal

<400> 22

Tyr His Arg Leu Arg Asp Leu Leu Leu Ile Val Lys Arg Ile Val Glu
1   5   10   15

Leu Leu Gly Arg Arg
            20

<210> 23

<211> 23

<212> PRT

<213> animal

<400> 23

Gln Gln Leu Ala Thr Leu Ile Gln Lys Thr Tyr Arg Gly Trp Arg Cys
1   5   10   15

Arg Thr His Tyr Gln Leu Met
            20

<210> 24

<211> 24

<212> PRT

<213> animal

<400> 24

Arg Ala Ala Cys Ile Arg Ile Gln Lys Thr Ile Arg Gly Trp Leu Leu
 1   5   10   15
Arg Lys Arg Tyr Leu Cys Met Gln
                20

<210> 25

<211> 12

<212> PRT

<213> animal

<400> 25

Ile Asn Leu Lys Ala Ala Leu Ala Lys Lys Ile Leu
 1   5   10

<210> 26

<211> 26

<212> PRT

<213> animal

<400> 26

Gly Ile Gly Ala Val Leu Lys Val Leu Thr Thr Gly Leu Pro Ala Leu
 1   5   10   15
Ile Ser Trp Ile Lys Arg Lys Arg Gln Gln
                20   25

<210> 27

<211> 30

<212> PRT

<213> animal

<400> 27

His Ser Gln Gly Thr Phe Thr Thr Ser Asp Tyr Ser Lys Tyr Leu Asp

```
                1                   5                       10                      15
        Ser Arg Arg Ala Gln Asp Phe Val Gln Trp Leu Met Asn Thr
                            20                  25                  30
```

<210> 28

<211> 27

<212> PRT

<213> animal

<400> 28

```
        His Ser Asp Gly Thr Phe Thr Ser Glu Leu Ser Arg Leu Arg Asp Ser
                1                   5                   10                  15
        Ala Arg Leu Gln Arg Leu Leu Gln Gly Leu Val
                            20                  25
```

<210> 29

<211> 28

<212> PRT

<213> animal

<400> 29

```
        His Ser Asp Ala Val Phe Thr Asp Asn Tyr Thr Arg Leu Arg Lys Gln
                1                   5                   10                  15
        Met Ala Val Lys Lys Tyr Leu Asn Ser Ile Leu Asn
                            20                  25
```

<210> 30

<211> 33

<212> PRT

<213> animal

<400> 20

Tyr Ala Asp Gly Thr Phe Ile Ser Asp Tyr Ser Ala Ile Met Asn Lys
1   5   10   15
Ile Arg Gln Gln Asp Phe Val Asn Trp Leu Leu Ala Gln Gln Gln Lys
                 20   25   30
Ser

<210> 31

<211> 17

<212> PRT

<213> animal

<400> 31

Lys Leu Trp Lys Lys Leu Leu Lys Leu Leu Lys Lys Leu Leu Lys Leu
 1   5   10   15
Gly

<210> 32

<211> 5

<212> PRT

<213> eucaryotic cell

<400> 32

Lys Lys Lys Arg Lys
                5

<210> 33

<211> 26

<212> PRT

<213> eucaryotic cell

<400> 33

Met Leu Arg Thr Ser Ser Leu Phe Thr Arg Arg Val Gln Pro Ser Leu
 1   5   10   15

Phe Arg Asn Ile Leu Arg Leu Gln Ser Thr
                20   25

<210> 34

<211> 4

<212> PRT

<213> eucaryotic cell

<400> 34

Lys Asp Glu Leu

<210> 35

<211> 3

<212> PRT

<213> eucaryotic cell

<400> 35

Ser Lys Leu

<210> 36

<211> 4

<212> PRT

<213> eucaryotic cell

<220>

<222> (4)

<223> any amino acid

<400> 36

Cys Ala Ala Xaa

<210> 37

<211> 2

<212> PRT

<213> eucaryotic cell

<400> 37

Cys Cys

<210> 38

<211> 3

<212> PRT

<213> eucaryotic cell

<220>

<222> (2)

<223> any amino acid

<400> 38

Cys Xaa Cys

<210> 39

<211> 4

<212> PRT

<213> eucaryotic cell

<220>

<222> (3), (4)

<223> any amino acid

<400> 39

Cys Cys Xaa Xaa

<210> 40

<211> 16

<212> PRT

<213> Artificial Sequence

<400> 40

Gly Thr Gly Gly Ser Gly Gly Gly Thr Gly Gly Ser Gly Gly Gly Thr
1   5   10   15

<210> 41

<211> 647

<212> PRT

<213> Artificial Sequence

<400> 41

Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu
1   5   10   15

Val Glu Leu Asp Gly Asp Val Asn Gly His Arg Phe Ser Val Ser Gly
                20   25   30

Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Leu Lys Phe Ile
            35   40   45

Cys Thr Thr Gly Lys Leu Pro Val Pro Trp Pro Thr Leu Val Thr Thr
        50   55   60

Leu Thr Trp Gly Val Gln Cys Phe Ser Arg Tyr Pro Asp His Met Lys
65   70   75   80

Gln His Asp Phe Phe Lys Ser Ala Met Pro Glu Gly Tyr Val Gln Glu
                85   90   95

Arg Thr Ile Phe Phe Lys Asp Asp Gly Asn Tyr Lys Thr Arg Ala Glu

```
              100                 105                 110
Val Lys Phe Glu Gly Asp Thr Leu Val Asn Arg Ile Glu Leu Lys Gly
         115                 120                 125
Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu Gly His Lys Leu Glu Tyr
         130                 135                 140
Asn Tyr Ile Ser His Asn Val Tyr Ile Thr Ala Asp Lys Gln Lys Asn
145                 150                 155                 160
Gly Ile Lys Ala Asn Phe Lys Ile Arg His Asn Ile Glu Asp Gly Ser
              165                 170                 175
Val Gln Leu Ala Asp His Tyr Gln Gln Asn Thr Pro Ile Gly Asp Gly
              180                 185                 190
Pro Val Leu Leu Pro Asp Asn His Tyr Leu Ser Thr Gln Ser Ala Leu
         195                 200                 205
Ser Lys Asp Pro Lys Glu Lys Arg Asp His Met Val Leu Leu Glu Phe
         210                 215                 220
Val Thr Ala Ala Arg Met His Asp Gln Leu Thr Glu Glu Gln Ile Ala
225                 230                 235                 240
Glu Phe Lys Glu Ala Phe Ser Leu Phe Asp Lys Asp Gly Asp Gly Thr
              245                 250                 255
Ile Thr Thr Lys Glu Leu Gly Thr Val Met Arg Ser Leu Gly Gln Asn
              260                 265                 270
Pro Thr Glu Ala Glu Leu Gln Asp Met Ile Asn Glu Val Asp Ala Asp
         275                 280                 285
Gly Asn Gly Thr Ile Tyr Phe Pro Glu Phe Leu Thr Met Met Ala Arg
         290                 295                 300
Lys Met Lys Asp Thr Asp Ser Glu Glu Glu Ile Arg Glu Ala Phe Arg
305                 310                 315                 320
```

Val Phe Asp Lys Asp Gly Asn Gly Tyr Ile Ser Ala Ala Gln Leu Arg
            325   330   335

His Val Met Thr Asn Leu Gly Glu Lys Leu Thr Asp Glu Glu Val Asp
            340   345   350

Glu Met Ile Arg Glu Ala Asp Ile Asp Gly Asp Gly Gln Val Asn Tyr
            355   .   360   365

Glu Glu Phe Val Gln Met Met Thr Ala Lys Gly Gly Lys Arg Arg Trp
    370   375   380

Lys Lys Asn Phe Ile Ala Val Ser Ala Ala Asn Arg Phe Lys Lys Ile
385   390   395   400

Ser Ser Ser Gly Ala Leu Glu Leu Met Val Ser Lys Gly Glu Glu Leu
                    405   410   415

Phe Thr Gly Val Val Pro Ile Leu Val Glu Leu Asp Gly Asp Val Asn
                    420   425   430

Gly His Lys Phe Ser Val Ser Gly Glu Gly Glu Gly Asp Ala Thr Tyr
                    435   440   445

Gly Lys Leu Thr Leu Lys Leu Ile Cys Thr Thr Gly Lys Leu Pro Val
    450   455   460

Pro Trp Pro Thr Leu Val Thr Thr Leu Gly Tyr Gly Leu Gln Cys Phe
465   470   475   480

Ala Arg Tyr Pro Asp His Met Lys Gln His Asp Phe Phe Lys Ser Ala
                    485   490   495

Met Pro Glu Gly Tyr Val Gln Glu Arg Thr Ile Phe Phe Lys Asp Asp
            500   505   510

Gly Asn Tyr Lys Thr Arg Ala Glu Val Lys Phe Glu Gly Asp Thr Leu
            515   520   525

Val Asn Arg Ile Glu Leu Lys Gly Ile Asp Phe Lys Glu Asp Gly Asn

```
                530                    535                    540
Ile Leu Gly His Lys Leu Glu Tyr Asn Tyr Asn Ser His Asn Val Tyr
545                    550                    555                    560
Ile Thr Ala Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile
                    565                    570                    575
Arg His Asn Ile Glu Asp Gly Gly Val Gln Leu Ala Asp His Tyr Gln
                    580                    585                    590
Gln Asn Thr Pro Ile Gly Asp Gly Pro Val Leu Leu Pro Asp Asn His
                    595                    600                    605
Tyr Leu Ser Tyr Gln Ser Ala Leu Ser Lys Asp Pro Asn Glu Lys Arg
        610                    615                    620
Asp His Met Val Leu Leu Glu Phe Val Thr Ala Ala Gly Ile Thr Leu
625                    630                    635                    640
Gly Met Asp Glu Leu Tyr Lys
                    645
```

<210> 42

<211> 653

<212> PRT

<213> Artificial Sequence

<400> 42

```
Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu
 1               5                   10                  15
Val Glu Leu Asp Gly Asp Val Asn Gly His Arg Phe Ser Val Ser Gly
                20                  25                  30
Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Leu Lys Phe Ile
            35                  40                  45
Cys Thr Thr Gly Lys Leu Pro Val Pro Trp Pro Thr Leu Val Thr Thr
```

```
              50                    55                    60
Leu Thr Trp Gly Val Gln Cys Phe Ser Arg Tyr Pro Asp His Met Lys
      65                    70                    75                    80
Gln His Asp Phe Phe Lys Ser Ala Met Pro Glu Gly Tyr Val Gln Glu
                  85                    90                    95
Arg Thr Ile Phe Phe Lys Asp Asp Gly Asn Tyr Lys Thr Arg Ala Glu
                  100                   105                   110
Val Lys Phe Glu Gly Asp Thr Leu Val Asn Arg Ile Glu Leu Lys Gly
              115                   120                   125
Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu Gly His Lys Leu Glu Tyr
          130                   135                   140
Asn Tyr Ile Ser His Asn Val Tyr Ile Thr Ala Asp Lys Gln Lys Asn
145                   150                   155                   160
Gly Ile Lys Ala Asn Phe Lys Ile Arg His Asn Ile Glu Asp Gly Ser
                  165                   170                   175
Val Gln Leu Ala Asp His Tyr Gln Gln Asn Thr Pro Ile Gly Asp Gly
              180                   185                   190
Pro Val Leu Leu Pro Asp Asn His Tyr Leu Ser Thr Gln Ser Ala Leu
          195                   200                   205
Ser Lys Asp Pro Lys Glu Lys Arg Asp His Met Val Leu Leu Glu Phe
          210                   215                   220
Val Thr Ala Ala Arg Met His Asp Gln Leu Thr Glu Glu Gln Ile Ala
225                   230                   235                   240
Glu Phe Lys Glu Ala Phe Ser Leu Phe Asp Lys Asp Gly Asp Gly Thr
                  245                   250                   255
Ile Thr Thr Lys Glu Leu Gly Thr Val Met Arg Ser Leu Gly Gln Asn
              260                   265                   270
```

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Pro Thr Glu Ala Glu Leu Gln Asp Met Ile Asn Glu Val Asp Ala Asp
          275   280   285

Gly Asn Gly Thr Ile Tyr Phe Pro Glu Phe Leu Thr Met Met Ala Arg
          290   295   300

Lys Met Lys Asp Thr Asp Ser Glu Glu Glu Ile Arg Glu Ala Phe Arg
305   310   315   320

Val Phe Asp Lys Asp Gly Asn Gly Tyr Ile Ser Ala Ala Gln Leu Arg
              325   330   335

His Val Met Thr Asn Leu Gly Glu Lys Leu Thr Asp Glu Glu Val Asp
              340   345   350

Glu Met Ile Arg Glu Ala Asp Ile Asp Gly Asp Gly Gln Val Asn Tyr
          355   360   365

Glu Glu Phe Val Gln Met Met Thr Ala Lys Gly Gly Lys Arg Arg Trp
          370   375   380

Lys Lys Asn Phe Ile Ala Val Ser Ala Ala Asn Arg Phe Lys Lys Ile
385   390   395   400

Ser Ser Ser Gly Ala Leu Glu Leu Met Thr Gly Lys Leu Pro Val Pro
              405   410   415

Trp Pro Thr Leu Val Thr Thr Leu Gly Tyr Gly Leu Gln Cys Phe Ala
              420   425   430

Arg Tyr Pro Asp His Met Lys Gln His Asp Phe Phe Lys Ser Ala Met
          435   440   445

Pro Glu Gly Tyr Val Gln Glu Arg Thr Ile Phe Phe Lys Asp Asp Gly
          450   455   460

Asn Tyr Lys Thr Arg Ala Glu Val Lys Phe Glu Gly Asp Thr Leu Val
465   470   475   480

Asn Arg Ile Glu Leu Lys Gly Ile Asp Phe Lys Glu Asp Gly Asn Ile

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```
                   485                    490                    495
Leu Gly His Lys Leu Glu Tyr Asn Tyr Asn Ser His Asn Val Tyr Ile
              500                    505                    510
Thr Ala Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile Arg
          515                    520                    525
His Asn Ile Glu Asp Gly Gly Val Gln Leu Ala Asp His Tyr Gln Gln
      530                    535                    540
Asn Thr Pro Ile Gly Asp Gly Pro Val Leu Leu Pro Asp Asn His Tyr
545                    550                    550                    560
Leu Ser Tyr Gln Ser Ala Leu Ser Lys Asp Pro Asn Glu Lys Arg Asp
                  565                    570                    575
His Met Val Leu Leu Glu Phe Val Thr Ala Ala Gly Ile Thr Leu Gly
              580                    585                    590
Met Asp Glu Leu Tyr Lys Gly Gly Ser Gly Gly Met Val Ser Lys Gly
          595                    600                    605
Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu Val Glu Leu Asp Gly
      610                    615                    620
Asp Val Asn Gly His Lys Phe Ser Val Ser Gly Glu Gly Glu Gly Asp
625                    630                    635                    640
Ala Thr Tyr Gly Lys Leu Thr Leu Lys Leu Ile Cys Thr
                  645                    650

<210> 43

<211> 653

<212> PRT

<213> Artificial Sequence

<400> 43

Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu
```

```
      1                 5                 10                15
    Val Glu Leu Asp Gly Asp Val Asn Gly His Arg Phe Ser Val Ser Gly
                    20                25                30
    Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Leu Lys Phe Ile
                35                40                45
    Cys Thr Thr Gly Lys Leu Pro Val Pro Trp Pro Thr Leu Val Thr Thr
            50                55                60
    Leu Thr Trp Gly Val Gln Cys Phe Ser Arg Tyr Pro Asp His Met Lys
        65                70                75                80
    Gln His Asp Phe Phe Lys Ser Ala Met Pro Glu Gly Tyr Val Gln Glu
                    85                90                95
    Arg Thr Ile Phe Phe Lys Asp Asp Gly Asn Tyr Lys Thr Arg Ala Glu
                    100               105               110
    Val Lys Phe Glu Gly Asp Thr Leu Val Asn Arg Ile Glu Leu Lys Gly
                115               120               125
    Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu Gly His Lys Leu Glu Tyr
                130               135               140
    Asn Tyr Ile Ser His Asn Val Tyr Ile Thr Ala Asp Lys Gln Lys Asn
    145               150               155               160
    Gly Ile Lys Ala Asn Phe Lys Ile Arg His Asn Ile Glu Asp Gly Ser
                    165               170               175
    Val Gln Leu Ala Asp His Tyr Gln Gln Asn Thr Pro Ile Gly Asp Gly
                    180               185               190
    Pro Val Leu Leu Pro Asp Asn His Tyr Leu Ser Thr Gln Ser Ala Leu
                195               200               205
    Ser Lys Asp Pro Lys Glu Lys Arg Asp His Met Val Leu Leu Glu Phe
        210               215               220
```

Val Thr Ala Ala Arg Met His Asp Gln Leu Thr Glu Glu Gln Ile Ala
225   230   235   240

Glu Phe Lys Glu Ala Phe Ser Leu Phe Asp Lys Asp Gly Asp Gly Thr
               245   250   255

Ile Thr Thr Lys Glu Leu Gly Thr Val Met Arg Ser Leu Gly Gln Asn
               260   265   270

Pro Thr Glu Ala Glu Leu Gln Asp Met Ile Asn Glu Val Asp Ala Asp
               275   280   285

Gly Asn Gly Thr Ile Tyr Phe Pro Glu Phe Leu Thr Met Met Ala Arg
        290   295   300

Lys Met Lys Asp Thr Asp Ser Glu Glu Glu Ile Arg Glu Ala Phe Arg
305   310   315   320

Val Phe Asp Lys Asp Gly Asn Gly Tyr Ile Ser Ala Ala Gln Leu Arg
               325   330   335

His Val Met Thr Asn Leu Gly Glu Lys Leu Thr Asp Glu Glu Val Asp
               340   345   350

Glu Met Ile Arg Glu Ala Asp Ile Asp Gly Asp Gly Gln Val Asn Tyr
        355   360   365

Glu Glu Phe Val Gln Met Met Thr Ala Lys Gly Gly Lys Arg Arg Trp
        370   375   380

Lys Lys Asn Phe Ile Ala Val Ser Ala Ala Asn Arg Phe Lys Lys Ile
385   390   395   400

Ser Ser Ser Gly Ala Leu Glu Leu Met Gln Lys Asn Gly Ile Lys Ala
               405   410   415

Asn Phe Lys Ile Arg His Asn Ile Glu Asp Gly Gly Val Gln Leu Ala
               420   425   430

Asp His Tyr Gln Gln Asn Thr Pro Ile Gly Asp Gly Pro Val Leu Leu

```
                435                         440                         445
Pro Asp Asn His Tyr Leu Ser Tyr Gln Ser Ala Leu Ser Lys Asp Pro
        450                     455                     460
Asn Glu Lys Arg Asp His Met Val Leu Leu Glu Phe Val Thr Ala Ala
465                     470                     475                     480
Gly Ile Thr Leu Gly Met Asp Glu Leu Tyr Lys Gly Gly Ser Gly Gly
                485                     490                     495
Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu
                500                     505                     510
Val Glu Leu Asp Gly Asp Val Asn Gly His Lys Phe Ser Val Ser Gly
            515                     520                     525
Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Leu Lys Leu Ile
        530                     535                     540
Cys Thr Thr Gly Lys Leu Pro Val Pro Trp Pro Thr Leu Val Thr Thr
545                     550                     555                     560
Leu Gly Tyr Gly Leu Gln Cys Phe Ala Arg Tyr Pro Asp His Met Lys
                565                     570                     575
Gln His Asp Phe Phe Lys Ser Ala Met Pro Glu Gly Tyr Val Gln Glu
            580                     585                     590
Arg Thr Ile Phe Phe Lys Asp Asp Gly Asn Tyr Lys Thr Arg Ala Glu
            595                     600                     605
Val Lys Phe Glu Gly Asp Thr Leu Val Asn Arg Ile Glu Leu Lys Gly
        610                     615                     620
Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu Gly His Lys Leu Glu Tyr
625                     630                     635                     640
Asn Tyr Asn Ser His Asn Val Tyr Ile Thr Ala Asp Lys
            645                     650
```

<210> 44

<211> 653

<212> PRT

<213> Artificial Sequence

<400> 44

Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu
1   5   10   15

Val Glu Leu Asp Gly Asp Val Asn Gly His Arg Phe Ser Val Ser Gly
                20   25   30

Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Leu Lys Phe Ile
            35   40   45

Cys Thr Thr Gly Lys Leu Pro Val Pro Trp Pro Thr Leu Val Thr Thr
        50   55   60

Leu Thr Trp Gly Val Gln Cys Phe Ser Arg Tyr Pro Asp His Met Lys
65   70   75   80

Gln His Asp Phe Phe Lys Ser Ala Met Pro Glu Gly Tyr Val Gln Glu
                85   90   95

Arg Thr Ile Phe Phe Lys Asp Asp Gly Asn Tyr Lys Thr Arg Ala Glu
                100   105   110

Val Lys Phe Glu Gly Asp Thr Leu Val Asn Arg Ile Glu Leu Lys Gly
                115   120   125

Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu Gly His Lys Leu Glu Tyr
            130   135   140

Asn Tyr Ile Ser His Asn Val Tyr Ile Thr Ala Asp Lys Gln Lys Asn
145   150   155   160

Gly Ile Lys Ala Asn Phe Lys Ile Arg His Asn Ile Glu Asp Gly Ser
                165   170   175

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Val Gln Leu Ala Asp His Tyr Gln Gln Asn Thr Pro Ile Gly Asp Gly
          180   185   190

Pro Val Leu Leu Pro Asp Asn His Tyr Leu Ser Thr Gln Ser Ala Leu
          195   200   205

Ser Lys Asp Pro Lys Glu Lys Arg Asp His Met Val Leu Leu Glu Phe
          210   215   220

Val Thr Ala Ala Arg Met His Asp Gln Leu Thr Glu Glu Gln Ile Ala
225   230   235   240

Glu Phe Lys Glu Ala Phe Ser Leu Phe Asp Lys Asp Gly Asp Gly Thr
                  245   250   255

Ile Thr Thr Lys Glu Leu Gly Thr Val Met Arg Ser Leu Gly Gln Asn
              260   265   270

Pro Thr Glu Ala Glu Leu Gln Asp Met Ile Asn Glu Val Asp Ala Asp
          275   280   285

Gly Asn Gly Thr Ile Tyr Phe Pro Glu Phe Leu Thr Met Met Ala Arg
          290   295   300

Lys Met Lys Asp Thr Asp Ser Glu Glu Glu Ile Arg Glu Ala Phe Arg
305   310   315   320

Val Phe Asp Lys Asp Gly Asn Gly Tyr Ile Ser Ala Ala Gln Leu Arg
                  325   330   335

His Val Met Thr Asn Leu Gly Glu Lys Leu Thr Asp Glu Glu Val Asp
                  340   345   350

Glu Met Ile Arg Glu Ala Asp Ile Asp Gly Asp Gly Gln Val Asn Tyr
              355   360   365

Glu Glu Phe Val Gln Met Met Thr Ala Lys Gly Gly Lys Arg Arg Trp
          370   375   380

Lys Lys Asn Phe Ile Ala Val Ser Ala Ala Asn Arg Phe Lys Lys Ile

Ser Ser Ser Gly Ala Leu Glu Leu Met Asp Gly Gly Val Gln Leu Ala

                405   410   415

Asp His Tyr Gln Gln Asn Thr Pro Ile Gly Asp Gly Pro Val Leu Leu

                420   425   430

Pro Asp Asn His Tyr Leu Ser Tyr Gln Ser Ala Leu Ser Lys Asp Pro

                435   440   445

Asn Glu Lys Arg Asp His Met Val Leu Leu Glu Phe Val Thr Ala Ala

                450   455   460

Gly Ile Thr Leu Gly Met Asp Glu Leu Tyr Lys Gly Gly Ser Gly Gly

465   470   475   480

Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu

                485   490   495

Val Glu Leu Asp Gly Asp Val Asn Gly His Lys Phe Ser Val Ser Gly

                500   505   510

Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Leu Lys Leu Ile

                515   520   525

Cys Thr Thr Gly Lys Leu Pro Val Pro Trp Pro Thr Leu Val Thr Thr

                530   535   540

Leu Gly Tyr Gly Leu Gln Cys Phe Ala Arg Tyr Pro Asp His Met Lys

545   550   555   560

Gln His Asp Phe Phe Lys Ser Ala Met Pro Glu Gly Tyr Val Gln Glu

                565   570   575

Arg Thr Ile Phe Phe Lys Asp Asp Gly Asn Tyr Lys Thr Arg Ala Glu

                580   585   590

Val Lys Phe Glu Gly Asp Thr Leu Val Asn Arg Ile Glu Leu Lys Gly

        595   600   605

Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu Gly His Lys Leu Glu Tyr
    610   615   620

Asn Tyr Asn Ser His Asn Val Tyr Ile Thr Ala Asp Lys Gln Lys Asn
625   630   635   640

Gly Ile Lys Ala Asn Phe Lys Ile Arg His Asn Ile Glu
                645   650

<210> 45

<211> 653

<212> PRT

<213> Artificial Sequence

<400> 45

Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu
    1   5   10   15

Val Glu Leu Asp Gly Asp Val Asn Gly His Arg Phe Ser Val Ser Gly
                20   25   30

Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Leu Lys Phe Ile
                35   40   45

Cys Thr Thr Gly Lys Leu Pro Val Pro Trp Pro Thr Leu Val Thr Thr
    50   55   60

Leu Thr Trp Gly Val Gln Cys Phe Ser Arg Tyr Pro Asp His Met Lys
65   70   75   80

Gln His Asp Phe Phe Lys Ser Ala Met Pro Glu Gly Tyr Val Gln Glu
                85   90   95

Arg Thr Ile Phe Phe Lys Asp Asp Gly Asn Tyr Lys Thr Arg Ala Glu
                100   105   110

Val Lys Phe Glu Gly Asp Thr Leu Val Asn Arg Ile Glu Leu Lys Gly
                115   120   125

Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu Gly His Lys Leu Glu Tyr
          130   135   140
Asn Tyr Ile Ser His Asn Val Tyr Ile Thr Ala Asp Lys Gln Lys Asn
145   150   155   160
Gly Ile Lys Ala Asn Phe Lys Ile Arg His Asn Ile Glu Asp Gly Ser
                    165   170   175
Val Gln Leu Ala Asp His Tyr Gln Gln Asn Thr Pro Ile Gly Asp Gly
                    180   185   190
Pro Val Leu Leu Pro Asp Asn His Tyr Leu Ser Thr Gln Ser Ala Leu
                    195   200   205
Ser Lys Asp Pro Lys Glu Lys Arg Asp His Met Val Leu Leu Glu Phe
          210   215   220
Val Thr Ala Ala Arg Met His Asp Gln Leu Thr Glu Glu Gln Ile Ala
225   230   235   240
Glu Phe Lys Glu Ala Phe Ser Leu Phe Asp Lys Asp Gly Asp Gly Thr
                    245   250   255
Ile Thr Thr Lys Glu Leu Gly Thr Val Met Arg Ser Leu Gly Gln Asn
                    260   265   270
Pro Thr Glu Ala Glu Leu Gln Asp Met Ile Asn Glu Val Asp Ala Asp
                    275   280   285
Gly Asn Gly Thr Ile Tyr Phe Pro Glu Phe Leu Thr Met Met Ala Arg
          290   295   300
Lys Met Lys Asp Thr Asp Ser Glu Glu Glu Ile Arg Glu Ala Phe Arg
305   310   315   320
Val Phe Asp Lys Asp Gly Asn Gly Tyr Ile Ser Ala Ala Gln Leu Arg
                    325   330   335
His Val Met Thr Asn Leu Gly Glu Lys Leu Thr Asp Glu Glu Val Asp

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              340                   345                   350
Glu Met Ile Arg Glu Ala Asp Ile Asp Gly Asp Gly Gln Val Asn Tyr
              355                   360                   365
Glu Glu Phe Val Gln Met Met Thr Ala Lys Gly Gly Lys Arg Arg Trp
              370                   375                   380
Lys Lys Asn Phe Ile Ala Val Ser Ala Ala Asn Arg Phe Lys Lys Ile
385                   390                   395                   400
Ser Ser Ser Gly Ala Leu Glu Leu Met Leu Pro Asp Asn His Tyr Leu
                  405                   410                   415
Ser Tyr Gln Ser Ala Leu Ser Lys Asp Pro Asn Glu Lys Arg Asp His
                  420                   425                   430
Met Val Leu Leu Glu Phe Val Thr Ala Ala Gly Ile Thr Leu Gly Met
                  435                   440                   445
Asp Glu Leu Tyr Lys Gly Gly Ser Gly Gly Met Val Ser Lys Gly Glu
              450                   455                   460
Glu Leu Phe Thr Gly Val Val Pro Ile Leu Val Glu Leu Asp Gly Asp
465                   470                   475                   480
Val Asn Gly His Lys Phe Ser Val Ser Gly Glu Gly Glu Gly Asp Ala
                  485           .       490                   495
Thr Tyr Gly Lys Leu Thr Leu Lys Leu Ile Cys Thr Thr Gly Lys Leu
                  500                   505                   510
Pro Val Pro Trp Pro Thr Leu Val Thr Thr Leu Gly Tyr Gly Leu Gln
                  515                   520                   525
Cys Phe Ala Arg Tyr Pro Asp His Met Lys Gln His Asp Phe Phe Lys
              530                   535                   540
Ser Ala Met Pro Glu Gly Tyr Val Gln Glu Arg Thr Ile Phe Phe Lys
545                   550                   555                   560
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Asp Asp Gly Asn Tyr Lys Thr Arg Ala Glu Val Lys Phe Glu Gly Asp
                565   570   575

Thr Leu Val Asn Arg Ile Glu Leu Lys Gly Ile Asp Phe Lys Glu Asp
                580   585   590

Gly Asn Ile Leu Gly His Lys Leu Glu Tyr Asn Tyr Asn Ser His Asn
                595   600   605

Val Tyr Ile Thr Ala Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe
            610   615   620

Lys Ile Arg His Asn Ile Glu Asp Gly Gly Val Gln Leu Ala Asp His
625   630   635   640

Tyr Gln Gln Asn Thr Pro Ile Gly Asp Gly Pro Val Leu
                645   650

<210> 46

<211> 653

<212> PRT

<213> Artificial Sequence

<400> 46

Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu
  1   5   10   15

Val Glu Leu Asp Gly Asp Val Asn Gly His Arg Phe Ser Val Ser Gly
                20   25   30

Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Leu Lys Phe Ile
                35   40   45

Cys Thr Thr Gly Lys Leu Pro Val Pro Trp Pro Thr Leu Val Thr Thr
            50   55   60

Leu Thr Trp Gly Val Gln Cys Phe Ser Arg Tyr Pro Asp His Met Lys
65   70   75   80

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Gln His Asp Phe Phe Lys Ser Ala Met Pro Glu Gly Tyr Val Gln Glu
                        85                  90                  95
Arg Thr Ile Phe Phe Lys Asp Asp Gly Asn Tyr Lys Thr Arg Ala Glu
                       100                 105                 110
Val Lys Phe Glu Gly Asp Thr Leu Val Asn Arg Ile Glu Leu Lys Gly
                   115                 120                 125
Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu Gly His Lys Leu Glu Tyr
               130                 135                 140
Asn Tyr Ile Ser His Asn Val Tyr Ile Thr Ala Asp Lys Gln Lys Asn
145                 150                 155                 160
Gly Ile Lys Ala Asn Phe Lys Ile Arg His Asn Ile Glu Asp Gly Ser
                       165                 170                 175
Val Gln Leu Ala Asp His Tyr Gln Gln Asn Thr Pro Ile Gly Asp Gly
                   180                 185                 190
Pro Val Leu Leu Pro Asp Asn His Tyr Leu Ser Thr Gln Ser Ala Leu
                   195                 200                 205
Ser Lys Asp Pro Lys Glu Lys Arg Asp His Met Val Leu Leu Glu Phe
               210                 215                 220
Val Thr Ala Ala Arg Met His Asp Gln Leu Thr Glu Glu Gln Ile Ala
225                 230                 235                 240
Glu Phe Lys Glu Ala Phe Ser Leu Phe Asp Lys Asp Gly Asp Gly Thr
                       245                 250                 255
Ile Thr Thr Lys Glu Leu Gly Thr Val Met Arg Ser Leu Gly Gln Asn
                   260                 265                 270
Pro Thr Glu Ala Glu Leu Gln Asp Met Ile Asn Glu Val Asp Ala Asp
               275                 280                 285
Gly Asn Gly Thr Ile Tyr Phe Pro Glu Phe Leu Thr Met Met Ala Arg
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Lys Met Lys Asp Thr Asp Ser Glu Glu Glu Ile Arg Glu Ala Phe Arg
305   310   315   320

Val Phe Asp Lys Asp Gly Asn Gly Tyr Ile Ser Ala Ala Gln Leu Arg
                    325   330   335

His Val Met Thr Asn Leu Gly Glu Lys Leu Thr Asp Glu Glu Val Asp
                    340   345   350

Glu Met Ile Arg Glu Ala Asp Ile Asp Gly Asp Gly Gln Val Asn Tyr
                    355   360   365

Glu Glu Phe Val Gln Met Met Thr Ala Lys Gly Gly Lys Arg Arg Trp
                    370   375   380

Lys Lys Asn Phe Ile Ala Val Ser Ala Ala Asn Arg Phe Lys Lys Ile
385   390   395   400

Ser Ser Ser Gly Ala Leu Glu Leu Met Ile Thr Leu Gly Met Asp Glu
                    405   410   415

Leu Tyr Lys Gly Gly Ser Gly Gly Met Val Ser Lys Gly Glu Glu Leu
                    420   425   430

Phe Thr Gly Val Val Pro Ile Leu Val Glu Leu Asp Gly Asp Val Asn
                    435   440   445

Gly His Lys Phe Ser Val Ser Gly Glu Gly Glu Gly Asp Ala Thr Tyr
                    450   455   460

Gly Lys Leu Thr Leu Lys Leu Ile Cys Thr Thr Gly Lys Leu Pro Val
465   470   475   480

Pro Trp Pro Thr Leu Val Thr Thr Leu Gly Tyr Gly Leu Gln Cys Phe
                    485   490   495

Ala Arg Tyr Pro Asp His Met Lys Gln His Asp Phe Phe Lys Ser Ala
                    500   505   510

Met Pro Glu Gly Tyr Val Gln Glu Arg Thr Ile Phe Phe Lys Asp Asp
         515   520   525

Gly Asn Tyr Lys Thr Arg Ala Glu Val Lys Phe Glu Gly Asp Thr Leu
         530   535   540

Val Asn Arg Ile Glu Leu Lys Gly Ile Asp Phe Lys Glu Asp Gly Asn
545   550   550   560

Ile Leu Gly His Lys Leu Glu Tyr Asn Tyr Asn Ser His Asn Val Tyr
         565   570   575

Ile Thr Ala Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile
         580   585   590

Arg His Asn Ile Glu Asp Gly Gly Val Gln Leu Ala Asp His Tyr Gln
         595   600   605

Gln Asn Thr Pro Ile Gly Asp Gly Pro Val Leu Leu Pro Asp Asn His
         610   615   620

Tyr Leu Ser Tyr Gln Ser Ala Leu Ser Lys Asp Pro Asn Glu Lys Arg
625   630   635   640

Asp His Met Val Leu Leu Glu Phe Val Thr Ala Ala Gly
         645   650